

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for ~~generating-modifying~~ a motor drive signal, ~~the motor drive signal created by a pulse generator and coupled to a motor via a compensator, the method~~ comprising:

~~receiving a pulsed motor drive signal from the pulse generator;~~

obtaining compensator current and compensator voltage measurements ~~including an output current of the compensator and an input voltage of the compensator, the output current of the compensator and the input voltage of the compensator generated in part due to the pulsed motor drive signal;~~

~~receiving a pulsed motor drive signal;~~

generating compensator reference values ~~based on a characteristic line impedance of a line coupling the pulse generator to the motor, a propagation delay parameter of the line, and the compensator current and compensator voltage measurements;~~ and

controllably adjusting a compensator current source and a compensator voltage source in response to ~~error signals computed from the compensator current and compensator voltage measurements and the compensator reference values in order to generate a compensator motor drive signal.~~

2. (Currently Amended) A method of compensating a motor drive signal, ~~the motor drive signal created by a pulse generator and coupled to a motor via a compensator, the method~~ comprising:

~~receiving the motor drive signal from the pulse generator;~~

obtaining compensator current and compensator voltage measurements ~~generated in part due to the motor drive signal;~~

~~receiving a motor drive signal;~~

generating compensator reference values based on a characteristic line impedance of a line coupling the pulse generator to the motor, a propagation delay parameter of the line, and the compensator current and compensator voltage measurements; and

controllably adjusting a compensator current source and a compensator voltage source in response to error signals computed from the compensator current and compensator voltage measurements and the compensator reference values in order to modify the motor drive signal, thereby providing a compensator motor drive signal.

3. (Original) The method of claim 2, wherein the step of generating compensator reference values comprises generating a reference current waveform and a reference voltage waveform.

4. (Canceled)

5. (Currently Amended) The method of claim ~~4~~2, wherein the characteristic line impedance is estimated in response to material properties of a transmission line.

6. (Currently Amended) The method of claim ~~4~~2, wherein the propagation delay parameter is estimated in response to material properties of a transmission line.

7. (Currently Amended) The method of claim ~~4~~2, wherein the propagation delay parameter is estimated in response to propagation delay measurements.

8. (Original) The method of claim 3, wherein the reference current waveform and the reference voltage waveform are continuous-time signals.

9. (Original) The method of claim 3, wherein the reference current waveform and the reference voltage waveform are discrete-time signals.

10. (Original) The method of claim 9, wherein the reference current waveform and the reference voltage waveforms are stored in a memory device.

11. (Original) The method of claim 2, wherein the step of obtaining compensator current and compensator voltage measurements comprises measuring a compensator input voltage and compensator output current.

12. (Original) The method of claim 11, wherein the measurements are analog signals.

13. (Original) The method of claim 11, wherein the measurements are discrete time signals.

14. (Original) The method of claim 2, wherein the compensator current source is a parallel active filter and the compensator voltage source is a series active filter.

15. (Original) The method of claim 14, wherein the parallel active filter and series active filter are controlled by a pulse controller.

16. (Original) The method of claim 15, wherein the pulse controller is a pulse width modulation controller.

17. (Canceled)

18. (Original) The method of claim 2, wherein the step of controllably adjusting a compensator current source and a compensator voltage source is performed by a microcontroller.

19. (Original) The method of claim 2, wherein the step of controllably adjusting a compensator current source and a compensator voltage source is performed using analog controllers.

20. (Currently Amended) The method of claim 19, wherein the analog controllers are ~~propositional-proportional~~ integral derivative (PID) controllers.

21. (Currently Amended) The method of claim 19, wherein the analog controllers are ~~propositional-proportional~~ integral (PI) controllers.

22. (Withdrawn) A method for adaptively compensating a motor drive signal generated by an actuator for transmission to a motor over a transmission line, the method comprising:

- a) measuring a motor drive signal received at the motor;
- b) determining a propagation delay of signals transmitted from the actuator to the motor;
- c) estimating a characteristic impedance of the transmission line using the propagation delay and the measured motor drive signal;

d) generating a compensated motor drive signal based on the estimated characteristic impedance of the transmission line;

e) measuring a value of the compensated motor drive signal received at the motor;

f) determining whether the measured value of the compensated motor drive signal received at the motor is within a threshold error level; and

g) based on the determination, repeating steps b) to f) until the measured value of the compensated motor drive signal is within the threshold error level.

23. (Withdrawn) The method of claim 22, wherein the motor drive signal received at the motor is selected from the group consisting of a current drive signal and a voltage drive signal.

24. (Withdrawn) The method of claim 22, wherein determining the propagation delay of signals transmitted from the actuator to the motor comprises determining the propagation delay of the transmission line based on a value of a characteristic impedance of the transmission line.

25. (Withdrawn) A system for providing a drive signal via a transmission line, the system comprising:

a voltage source for generating a voltage reference value;

a current source for generating a current reference value; and

a processor operable to measure an output current of the system and a voltage across the current source, and based on a characteristic impedance of the transmission line, a length of the transmission line, the voltage reference value and the current reference value, and the measured output current and the measured voltage across the current source to adjust the

current source and the voltage source in order to generate a drive signal for transmission over the transmission line.

26. (Withdrawn) The system of claim 25, wherein the processor provides the compensated drive signal based on the following relation:

$$\begin{bmatrix} \tilde{i}(t) \\ v(t,0) \end{bmatrix} = \frac{1}{1 + e^{-2ds}} \begin{bmatrix} \frac{1}{Z_0}(1 - e^{-2ds}) & -2 \\ -2e^{-2ds} & -Z_0(1 - e^{-2ds}) \end{bmatrix} \begin{bmatrix} \tilde{v}(t) \\ i(t,0) \end{bmatrix},$$

where Z_0 is a transmission line characteristic impedance, d is a propagation delay of the transmission line, $\tilde{v}(t)$ is the voltage across the current source, $\tilde{i}(t)$ is the current reference value, $v(t,0)$ is the voltage reference value, and $i(t,0)$ is the measured output current.

27. (Withdrawn) The system of claim 25, wherein the current source is a parallel active filter.

28. (Withdrawn) The system of claim 25, wherein the voltage source is a series active filter.

29. (Withdrawn) The system of claim 25, wherein the system is a hybrid filter.

30. (Withdrawn) The system of claim 25, wherein the system is a back-to-back rectifier-inverter.

31. (Withdrawn) The system of claim 25, wherein the system is selected from the group consisted of a compensator, a motor, and a pulse generator.

32. (Withdrawn) The system of claim 25, wherein the processor is selected from the group consisting of a pulse controller, a pulse width modulation controller, and a pulse frequency modulation controller.

33. (Withdrawn) A system comprising:

a pulse generator;

a compensator coupled to the pulse generator, where the compensator receives a pulse generated by the pulse generator and applies a linear combination of controlled voltages and currents to the pulse to generate a modified pulse; and

a motor coupled through a transmission line to the compensator, where the motor receives the modified pulse from the compensator.

34. (Withdrawn) The system of claim 33, wherein the system operates according to the following relationship:

$$\begin{bmatrix} \tilde{i}(t) \\ v(t,0) \end{bmatrix} = \frac{1}{1+e^{-2ds}} \begin{bmatrix} \frac{1}{Z_0}(1-e^{-2ds}) & -2 \\ -2e^{-2ds} & -Z_0(1-e^{-2ds}) \end{bmatrix} \begin{bmatrix} \tilde{v}(t) \\ i(t,0) \end{bmatrix},$$

where Z_0 is a transmission line characteristic impedance, d is a propagation delay of the transmission line, $\tilde{v}(t)$ is a line voltage at the pulse generator, $\tilde{i}(t)$ is a line current at the pulse generator, and $v(t,0)$ and $i(t,0)$ are a line voltage and a line current at a beginning of the transmission line.

35. (Withdrawn) The system of claim 33, wherein the pulse generator is a pulse wave modulated (PWM) inverter.

36. (New) The method of claim 1, wherein controllably adjusting the compensator current source and the compensator voltage source to generate a compensator motor drive signal comprises applying a linear combination of controlled voltages and currents to the pulsed motor drive signal to generate a modified pulse.

37. (New) The method of claim 36, further comprising propagating the modified pulse to the motor.

38. (New) The method of claim 37, further comprising combining the modified pulse with wave reflections created due to the line coupling the pulse generator to the motor to provide a desired voltage to the motor.

39. (New) The method of claim 1, wherein generating the compensator reference values comprises solving the following relation:

$$\begin{bmatrix} \tilde{i}(t) \\ v(t,0) \end{bmatrix} = \frac{1}{1 + e^{-2ds}} \begin{bmatrix} \frac{1}{Z_0}(1 - e^{-2ds}) & -2 \\ -2e^{-2ds} & -Z_0(1 - e^{-2ds}) \end{bmatrix} \begin{bmatrix} \tilde{v}(t) \\ i(t,0) \end{bmatrix},$$

where Z_0 is the characteristic line impedance, d is the propagation delay parameter of the line, $\tilde{v}(t)$ is the compensator voltage measurement, $i(t,0)$ is the compensator current measurement, $\tilde{i}(t)$ is a compensator current reference value, and $v(t,0)$ is a compensator voltage reference value.

40. (New) The method of claim 1, wherein generating the compensator motor drive signal comprises generating time-delayed versions of the compensator current measurement and the compensator voltage reference value.

41. (New) The method of claim 1, further comprising generating the error signals by comparing the compensator reference values to stored desired values of the compensator reference values.